

A Review of the Genus *Hingstoniola* (Hymenoptera: Sphecidae: Crabronini)

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Abstract.—*Niwoh* Tsuneki, 1984, is synonymized with *Hingstoniola* Turner and Waterston, 1926, and *Niwoh tarsata* Tsuneki, 1984, is transferred to the latter genus. An updated generic description of *Hingstoniola* is provided and differences from related genera are discussed. A section containing *Hingstoniola* in Bohart and Menke's key to Crabronini is revised. A key to males of the three included species is provided. *Hingstoniola pagdeni* is first recorded from Thailand.

Hingstoniola is a little-known genus of crabronine wasps, endemic to the Oriental Region. It was established by Turner and Waterston (1926) as a subgenus of *Crabro* for their new species *duplicata* from Sikkim, northern India. Pagden (1934) described a second species, *fimbriata* (nec Rossi, 1790), from Malaysia. Pate (1944) raised *Hingstoniola* to genus and suggested it was a member of his *Foxita* complex. Leclercq included it in his keys to the genera of Crabroninae (1951, 1954) and described the first female (1963). Court in Bohart and Menke (1976:417) partially redescribed the genus and summarized the available information. Most of these treatments are either incomplete or contain factual errors. In 1984a, Tsuneki described a new genus *Niwoh*, which is clearly a synonym of *Hingstoniola*. This paper is an attempt to correct inaccuracies and omissions and to present an updated review of the genus.

The following abbreviations are used for institutions in which the material is housed: BMNH: British Museum (Natural History), London, England (now The Natural History Museum); CAS: California Academy of Sciences, San Francisco, California, USA; USNM: United States National Museum of Natural History (= Smithsonian Institution), Washington, D.C., USA.

Genus HINGSTONIOLA Turner and Waterston

Hingstoniola Turner and Waterston, 1926:189 (as a subgenus of *Crabro*). Type species: *Crabro duplicatus* Turner and Waterston, 1926:190, by monotypy.

Niwoh Tsuneki, 1984a:20. Type species: *Niwoh tarsatus* Tsuneki, 1984a: 20, by monotypy. Gender: masculine ("Deva King, guardian giant bonze of Budda"). New synonymy.

Synonymy.—An analysis of the original description of *Niwoh* and a subsequent study of the type species of *Hingstoniola* and *Niwoh* convinced us that these two nominal genera are synonyms.

Diagnosis.—*Hingstoniola* is distinguished from other crabronines by the following combination of characters: scapal basin margined dorsally and laterally by a well-defined carina (Fig. 2) and bisected by a vertical carina in males and some females; median lobe of clypeus double-edged (Fig. 1), area between edges concave and delimited laterally by a longitudinal carina on each side; head and thorax with coarse, irregularly reticulating ridges, interspaces microareolate (Fig. 3), hence dull; frons with neither carina nor furrow between midocellus and scapal basin (Fig. 3); and males with flagellum fimbriate anteriorly (Fig. 2), foretarsus conspicuously expanded, and midtibia lacking apical spur.

Description.—Head and thorax with coarse, irregularly reticulating ridges superimposed on microareolate interspaces (Fig. 3); eyes asetose, inner orbits converging below; scapal basin bordered both dorsally and laterally by a well-defined carina (Fig. 2), bisected by vertical carina in males (Fig. 2) and some, but not all, females (Tsuneki, 1984a:24); frons with neither carina nor furrow between midocellus and transverse carina delimiting scapal basin (Fig. 3); orbital foveae present (Fig. 3); ocellar: triangle slightly broader than high (Fig. 3); postocular sulcus present, foveolate, delimited by carina, or absent; gena simple; occipital carina flanged, foveate, joining or ending just short of hypostomal carina; antennal sockets contiguous to each other, contiguous to or separated from orbit; scape bicarinate, carina well defined from base to

apex; male flagellum with 11 articles, modified, with anterior rather than ventral fringe of fimbriae (Fig. 2) (flagellum fimbriate in *pagdeni* and *tarsata*, and row of long, appressed setae on the flagellum of the holotype of *duplicata* apparently originally erect); flagellomeres I-X with raised, carina-like structure that has median, longitudinal slit (Figs. 4 and 5); slit bottom with micropores (we observed a carina on flagellomeres VI-X in *duplicata*, but could not study its microstructure); median lobe of clypeus double-edged (Fig. 1), area between edges concave and delimited laterally by a longitudinal carina on each side; palpal formula 6+4; mandibular apex tridentate in female (Fig. 1), bidentate in male; externoventral (= posterior) margin entire, inner margin with tooth on basal half; pronotal collar carinate anteriorly, notched medially, angulate laterally; scutum without anterolateral transverse carinae; notauli and admedian lines present or obscured by coarse sculpture; prescutellar sulcus well developed and foveate; axillae moderately broadened; scutellum margined laterally and posteriorly; metanotum coarsely sculptured; mesopleuron with postspiracular carina, omalulus and acetabular carina continuous; verticaulus present; sternaulus, hypersternaulus, and mesopleuraulus absent; propodeum coarsely sculptured, enclosure areolate; lateral propodeal carina well developed; male legs with fore- and midtarsi modified, forefemoral venter with longitudinal carina; midtibial spur present in female, absent in male; recurrent vein joining submarginal cell beyond middle of cell's hindmargin; jugal lobe slightly longer than submedian cell (appears shorter in some specimens); gaster sessile; pygidial plate narrow, concave in female, absent in male.

Systematics.—A study of cladistic relationships of *Hingstoniola* to other Crabronini is beyond the scope of the present paper. Instead, comparisons are made between *Hingstoniola* and other genera in which the scapal basin is delimited by a carina both dorsally and laterally. This conspicuous feature, found only in *Enoplolindenius* (New World), *Foxita* (Neotropical), *Hingstoniola*, and *Vechtia* (Oriental), is clearly derived within the Sphecidae and may be a synapomorphy of these genera. The goal is to facilitate recognition of *Hingstoniola* and to review the distribution of taxonomically important characters.

Unlike *Hingstoniola*, the scapal basin in the other three genera is not bisected by a vertical carina; the

clypeal margin is single-edged; the head and thorax are shiny, not reticulate (head matte in *Foxita leydensis* Leclercq); the frons has a carina between the anterior ocellus and the scapal basin (reduced in *Foxita castrica* Leclercq); and the male flagellum is not fimbriate anteriorly but has a ventral setal fringe in some *Enoplolindenius* and some *Foxita*. The male foretarsus is conspicuously expanded in *Hingstoniola* and some *Enoplolindenius*, simple in the other two genera.

Hingstoniola, *Foxita*, and *Vechtia* differ from *Enoplolindenius* in having the mandible tridentate in the female and bidentate in the male, palpal formula 6+4, scutum without anterior transverse carinae, and female pygidial plate narrow, concave. *Enoplolindenius* has the mandibular apex simple; palpal formula 6+3; scutum with a distinctive carina that extends outwards from each notaulus parallel to the scutal foremargin; female pygidial plate broad, flat; and male midtibial spur present or absent.

Hingstoniola is further separated from *Foxita* in having the following: the occipital carina does not form a complete circle, but joins the hypostomal carina or nearly so; and the hypersternaulus, mesopleuraulus, and male midtibial spur are absent. In most *Foxita* (in part from Leclercq, 1980), the occipital carina forms a complete circle separated from the hypostomal carina (evanescent mesoventrally in females of *beieri* Leclercq, *galibi* Pate, and *nabeieri* Leclercq, and subtangential to the apex of V-shaped hypostomal carina in *atorai* Pate species group), the hypersternaulus and mesopleuraulus are present or absent, and the male midtibial spur is present. In addition, the recurrent vein joins the submarginal cell beyond the midlength of the cell's hindmargin in *Hingstoniola*, before to beyond middle in *Foxita* (not always near middle as stated by Court).

Hingstoniola differs from *Vechtia* in having the following: the carina that borders the scapal basin dorsally is not lamellate, the occipital carina joins the hypostomal carina or nearly so, the sternaulus is absent, and the recurrent vein joins the submarginal cell beyond the middle of the cell's hindmargin. In *Vechtia*, the scapal basin carina is expanded dorsally into a triangular, downcurved lamella, the occipital carina forms a complete circle separated from the hypostomal carina, the sternaulus is present, and the recurrent vein joins the submarginal cell at or near the middle of the

cell's hindmargin. The male midtibial spur is absent in *Vechtia rugosa* (F. Smith), but present in *V. prerugosa* Leclercq (holotype examined).

The following replaces couplets 10-12 in the key to genera of Crabronini by Bohart and Menke, 1976: 374. The figure numbers refer to the illustrations in their book.

Three species are currently included in *Hingstoniola*: *duplicata* (Turner and Waterston), *pagdeni* Leclercq, and *tarsata* (Tsuneki). The female of *duplicata* is unknown and that of *tarsata* is not available for study. The differences between the males are summarized in the second key below.

KEY TO GENERA OF CRABRONINI WITH DORSALLY AND LATERALLY MARGINED SCAPAL BASIN

10. Scutum with transverse anterolateral carinae (fig. 121 H); mandibular apex simple; female pygidial plate broad, flat, coarsely punctate; New World *Enoplolindenus* Rohwer
- Scutum without transverse anterolateral carinae; mandibular apex tridentate in female, bidentate in male; female pygidial plate markedly narrowed, concave 11
11. Dorsal carina of scapal basin expanded medially into a downcurved, triangular lamella (fig. 122 I); sternaulus present; Oriental *Vechtia* Pate
- Dorsal carina of scapal basin nonlamellate medially; sternaulus absent 12
12. Head and thorax with coarse, reticulate sculpture; occipital carina not a complete circle, joining hypostomal carina or ending just short of it (hypostomal carina U-shaped); median clypeal lobe double-edged, area between edges concave and delimited laterally by longitudinal carina on each side; male flagellum with anterior fringe of fimbriae; male foretarsus conspicuously expanded; Oriental *Hingstoniola* Turner and Waterston
- Head and thorax without reticulate sculpture; occipital carina a complete circle (evanescent mesoventrally in some females), well separated from hypostomal carina (if latter U-shaped) or subparallel to it (if V-shaped); median clypeal lobe single-edged; male flagellum without anterior fringe of fimbriae; male foretarsus simple; Neotropical *Foxita* Pate
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KEY TO MALES OF *HINGSTONIOLA*

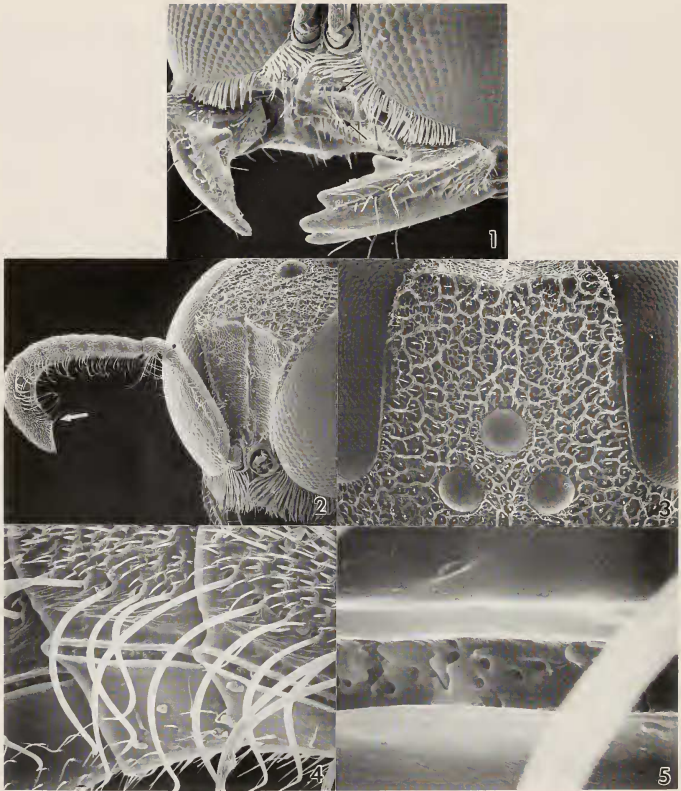
1. Median clypeal carina expanding to form a raised, blunt tooth that extends beyond clypeal margin; flagellomere XI with no basal tubercle; metanotum undivided mesally; forefemoral venter angulate at basal one-third of length, angle with cluster of erect setae; foretarsomeres I-III without well-defined color pattern, each with one long seta at anterodistal angle (= side away from articulation of tarsomere II); foretarsomere I acutely angulate anterodistally *duplicata* (Turner and Waterston)
- Median clypeal carina not expanding into median projection (free margin of clypeal lobe truncate mesally); flagellomere XI with sharp tubercle basoventrally (Fig. 2); metanotum anteromedially with lunate, sharply margined area; forefemoral venter with a few stiff, erect, sparsely spaced setae, not angulate at basal one-third; foretarsomeres I-III with conspicuous black pattern, anterior margins (= side away from tarsal articulations) with long, curved fimbriae except basally; foretarsomere I rounded anterodistally 2
2. Anterior margin of foretarsomere I about 1.3 x posterior margin; midlengths of midtarsomere II and midtarsomere III equal to their respective apical widths *tarsata* (Tsuneki)
- Anterior and posterior margins of foretarsomere I about equal in length; midlength of midtarsomere II 0.9 x apical width, of midtarsomere III 0.6 x apical width *pagdeni* Leclercq
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DISCUSSION OF SPECIES

***Hingstoniola duplicata* (Turner and Waterston)**

Crabro duplicata Turner and Waterston, 1926:190, male, incorrect original termination. Holotype: male, India: Sikkim: Kalimpong, 1220 m, 27 Mar 1924, R.W.G. Hingston collector (BMNH), examined. — Pagden, 1934:482 (comparison with *Crabro fimbriatus*). — As *Hingstoniola duplicata*: Pate, 1944:377 (new combination); Leclercq, 1951:52 (type examined), 1954: 218 (listed); Bohart and Menke, 1976: 417 (listed).

This distinctive species is known only from the holotype male, which is in poor condition. The labiomaxillary complex and right antenna are missing, and the apical two flagellomeres of the remaining antenna are disjointed. Apparently as a result of improper preservation, the eye surface is irregularly ridged, the ocelli are collapsed (alveolate in appearance), the wings are dirty, and many setae, including those on the antenna, are appressed



Figs. 1-5. *Hingstoniola pagdeni* Leclercq. 1, Female clypeus obliquely from below (x60), with arrows showing the upper and lower clypeal edges. 2, Male head and antenna obliquely from the side (x47), with arrow showing tubercle on flagellomere XI. 3, Male frons in top view (x79). 4, Flagellomeres VI, VII, and part of VIII (x470). 5, Slit of flagellomere VII (x3350).

to the integument. Fortunately, males of *duplicata* are easily distinguished from those of *pagdeni* and *tarsata* by the characters given in the key. Females will probably be most readily recognized by the undivided metanotum.

Turner and Waterston (1926) incorrectly described the forefemur of the male *duplicata* as having a ventral spine at one third of its length. In reality, the femur is angulate, with a cluster of erect setae at the angle. Pagden (1934) thought that *duplicata* differed from *pagdeni* in lacking the row of erect fimbriae on the flagellum, but the fimbrial row in the type is probably merely matted down.

Hingstoniola pagdeni Leclercq

Crabro fimbriata Pagden, 1934:482, male, incorrect original termination. Holotype: male, Malaysia: Kedah: Bukit Panchor, 4 June 1930, H.T. Pagden collector (BMNH), examined. Nec *Crabro fimbriatus* Rossi, 1790. — Pagden, 1934:476 (as prey of *Cerceris langkasukae*). — In *Hingstoniola*: Leclercq, 1951:52 (new combination, listed).

Hingstoniola pagdeni Leclercq, 1954:218, replacement name for *Crabro fimbriata* Pagden. — Leclercq, 1963:47 (Malaysia: Kuala Lumpur; description of female); Bohart and Menke, 1976: 418 (listed).

Crabro parviornatus Cameron: Leclercq, 1951:52, nomen nudum (Borneo: Kuching).

The holotype of *pagdeni* is also in poor condition: it lacks the flagella and gaster. The head is missing in the male labeled as *parviornatus* Cameron (the only specimen studied by Court in Bohart and Menke, 1976).

This species is very similar to *tarsata* (see the latter for discussion). The holotype of *pagdeni* was collected as prey of a *Cerceris* that Pagden described as *langkasukae* on p. 476, but called *spiniventris*, a nomen nudum, in the holotype data of *pagdeni* on p. 486 (Krombein, 1981:30, synonymized *langkasukae* with *bidentula* Maidl, 1926). Pagden himself reported that this was an unusual prey record since the other females were taken with buprestids, the normal prey of this species.

Hingstoniola pagdeni was described from Bukit Panchor, Kedah Province, Malaysia, and subsequently recorded from Kuching, Borneo (Leclercq, 1951) and Kuala Lumpur, Malaysia (Leclercq, 1963). An additional, northernmost locality is Doi Suthep mountain in Chiang Mai Province, Thailand (4 females, 3 males, 1-2 May 1989, W.J. Pulawski collector, CAS). These specimens were flying around bushes in the sun in a little stream valley not far from the Wat Phra That temple.

Hingstoniola tarsata (Tsuneki), new combination

Niwoh tarsata Tsuneki, 1984a:20, male, female, incorrect original termination (correctly spelled *tarsatus* on p. 25). Holotype: male, Philippines: Mindanao: Cagayan de Oro: Makahambus Cave, 15 Aug 1980, T. Murota collector (originally K. Tsuneki collection, now USNM), examined. — As *Niwoh tarsatus*: Tsuneki, 1984b: 2 (Philippines), 30 (in key).

In addition to the characters given in the key, *tarsata* and *pagdeni* differ in the shape of the clypeus and the flagellar slits. The median clypeal carina is flattened apically to form a triangular bevel in *tarsata*, whereas *pagdeni* has no bevel. The width of a flagellar slit is about two fimbria diameters in *tarsata* and about one diameter in *pagdeni* (Figs. 4, 5). So far, *tarsata* is known only from Mindanao Island, Philippines.

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